(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2001－7406
（P2001－7406A）
(43)公開日　平成13年１月12日(2001.1.12)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'(参考)
Ｈ０１Ｌ　33/00		Ｈ０１Ｌ　33/00	Ｎ	３Ｋ０４２
Ｆ２１Ｓ　2/00		Ｆ２１Ｍ　1/00	Ｒ	５Ｆ０４１
Ｆ２１Ｖ　13/00				

審査請求　未請求　請求項の数５　ＯＬ　（全６頁）

(21)出願番号　特願平11－179284

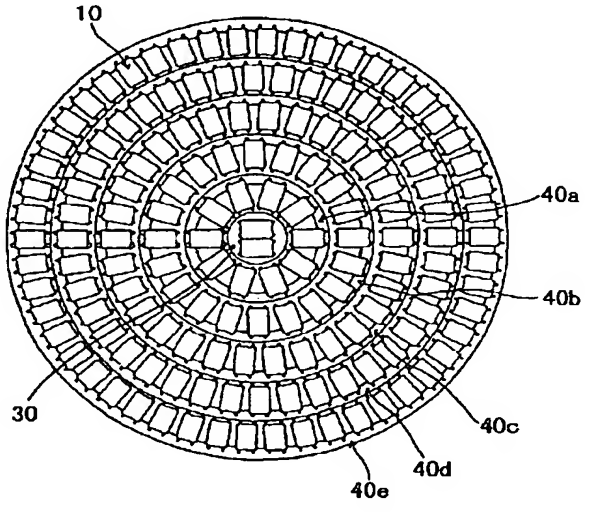
(22)出願日　平成11年６月25日(1999.6.25)

(71)出願人　000000192
岩崎電気株式会社
東京都港区芝３丁目12番４号
(72)発明者　末広　好伸
埼玉県北埼玉郡川里村赤城台362－26　岩崎情報機器株式会社内
(72)発明者　信沢　麻男
埼玉県北埼玉郡川里村赤城台362－26　岩崎情報機器株式会社内

Ｆターム(参考)　3K042 AA01 AC02 AC06 BA09 CA00
5F041 AA05 AA31 DA07 DA12 DA17
DA25 DA26 DA44 DB09 DC03
DC04 DC08 DC23 DC66 DC83
FF11 FF13

(54)【発明の名称】　発光ダイオード配列体

(57)【要約】
【目的】　本発明は複数の反射型発光ダイオードを立体的に配置する場合、量産性の向上を図ることができ、照射エリアにおいて均斉度が高くかつ外部放射効率が高いという、優れた光学特性を有する発光ダイオード配列体を提供することを目的とする。
【構成】　本発明は、発光素子と該発光素子に電力を供給するリード部と該発光素子の発光面に対向して設けられた凹面状反射面と該凹面状反射面で反射した光を外部に放射する放射面と、前記発光素子及びリード部の一部を封止すると共に前記凹面状反射面と放射面との間の空間を埋める光透過性材料とを有する複数の反射型発光ダイオードと、中央部に配置された反射型発光ダイオードを実装するための中央の平面基板と、該中央の平面基板以外の部分に配置された反射型発光ダイオードを実装するためのものであって、環状に形成されかつ中央の平面基板を取り囲むようにして配置された少なくとも一つの環状の平面基板とを具備し、前記中央の平面基板と前記環状の平面基板とは、異なる平面上に配置されていることを特徴とする。



PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-007406
(43)Date of publication of application : 12.01.2001

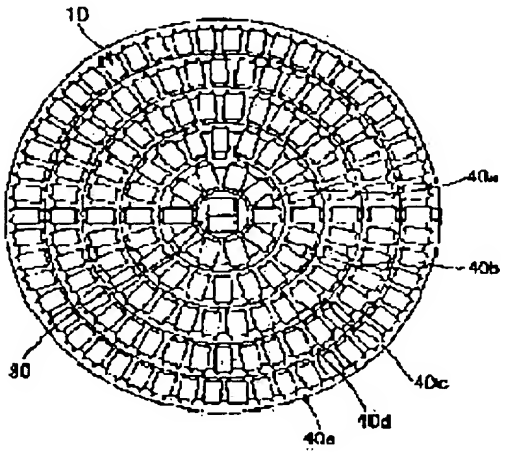
(51)Int.Cl. H01L 33/00
F21S 2/00
F21V 13/00

(21)Application number : 11-179284
(22)Date of filing : 25.06.1999

(71)Applicant : IWASAKI ELECTRIC CO LTD
(72)Inventor : SUEHIRO YOSHINOBU
NOBUSAWA ASAO

(54) LIGHT EMITTING DIODE ARRAY

(57)Abstract:
PROBLEM TO BE SOLVED: To enhance mass productivity of a light emitting diode array by forming a planar substrate annularly to surround a central planar substrate and positioning the annular planar substrate and the central planar substrate on different planes.
SOLUTION: A central planar substrate 30 is formed circularly while mounting a plurality of reflective light emitting diodes positioned in the center. Planar substrates 40a-40e are formed annularly with different radius while mounting a plurality of reflective light emitting diodes at a part other than the central part where the central planar substrate 30 is located. Each annular planar substrate 40a-40e is arranged stepwise on a different plane along the central axis of the central planar substrate 30 while aligning the central axis with that of the central planar substrate 30.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] Light emitting device The lead section which supplies power to this light emitting device The concave surface-like reflector countered and prepared in the luminescence side of this light emitting device The radial plane which emits outside the light reflected by this concave surface-like reflector Light-transmission nature material which fills the space between the aforementioned concave surface-like reflector and a radial plane while closing a part of aforementioned light emitting device and lead section It is the light emitting diode array object equipped with the above, and it is formed annularly, and at least one annular flat-surface substrate arranged as enclosed the central flat-surface substrate is provided, and it is characterized by being arranged on a different flat surface from the flat-surface substrate of the center of the above, and the aforementioned annular flat-surface substrate.
[Claim 2] The light emitting diode array object characterized by providing the following. Light emitting device The lead section which supplies power to this light emitting device The concave surface-like reflector countered and prepared in the luminescence side of this light emitting device It is for mounting two or more reflected type light emitting diodes which have the radial plane which emits outside the light reflected by this concave surface-like reflector, and the light-transmission nature material which fills the space between the aforementioned concave surface-like reflector and a radial plane while closing a part of aforementioned light emitting device and lead section, and the aforementioned reflected type light emitting diode, and is formed annularly, and they are two or more annular substrates.
[Claim 3] The aforementioned annular flat-surface substrate is the claim 1 which is plurality and is characterized by being arranged at a different plane, or a light emitting diode array object given in dyadic.
[Claim 4] Two or more aforementioned reflected type light emitting diodes are the claim 1 characterized by being arranged so that the convex shaped surface of the axial symmetry in which the radial plane contains the spherical surface or a conical surface may be touched, or a light emitting diode array object given in 3 terms.
[Claim 5] Two or more aforementioned reflected type light emitting diodes are straight lines which pass along the center of this concave surface-like reflector when the aforementioned concave surface-like reflector is seen from a transverse plane. The aforementioned reflected type light emitting diode which the edge of the aforementioned concave surface-like reflector is cut at two perpendicular flat surfaces, and is arranged by the aforementioned annular flat-surface substrate to the straight line which intersects perpendicularly with the medial axis of a concave surface-like reflector The claim 1 characterized by being arranged by cyclic as the cutting plane of the aforementioned concave surface-like reflector adjoins each other, or a light emitting diode array object given in 4 terms.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to improvement of the light emitting diode array object which arranges two or more reflected type light emitting diodes emitted outside, constitutes them after reflecting the light which a light emitting device emits by the concave surface-like reflector, for example, is used as the light source for image recognitions, or the light source for optical fibers.
[0002]
[Description of the Prior Art] Generally, there is a tungsten halogen lamp as the light source used for a printer, a copy machine, or facsimile as an optical instrument etc. Moreover, recently, light emitting diode attracts attention from a viewpoint of the ease or the life of a lamp of control of the problem of the heat ray from the light source within optical equipment, the size and capacity of equipment, and the light source. As this kind of the light source, various light emitting diode array objects are proposed. This kind of light emitting diode array object is the same in the distance from the radial plane of each light emitting diode to irradiation area, then can make equivalent the irradiation distribution of each light emitting diode in irradiation area, and can aim at improvement in regularity.
[0003]
[Problem(s) to be Solved by the Invention] By the way, with the conventional light emitting diode array object, the flat-surface substrate which mounts the holder which holds light emitting diode to a position, and light emitting diode which fixed to this holder was considered. However, by this method, the interval of a holder and a flat-surface substrate becomes large as it is separated from the center section of the attaching part to a periphery. For this reason, in order to create a light emitting diode array object, you have to prepare various kinds of light emitting diodes from which the length of the lead section differs.
[0004] and the light emitting diode of these various kinds -- the mould of the same area -- when creating by the transfer mold method using metal mold, the light emitting diode with the long length of the lead section has little number obtained by one mould fabrication compared with a short thing Therefore, since the long light emitting diode of the lead section is inferior in productivity, the conventional light emitting diode array object has the problem of not being suitable for mass production. Moreover, if a holder is not used, there is also a problem that the position precision of the periphery of light emitting diode becomes small especially. Furthermore, there is also a method of performing air wiring, without using a substrate for the light emitting diode fixed to the holder as an option. However, by this method, although the productivity of light emitting diode does not fall, wiring takes time and effort and there is a problem of not being suitable for mass-production nature. Moreover, in air wiring, an operator's hand and tool are caught in wiring, it is easy to produce an open circuit, and there is also a fault that the state after connection is unstable. In addition, if a holder is used, although the number of parts not only increases, but production of a holder will take time and effort, if a holder is not used, there is a problem that the fixation of light emitting diode itself becomes difficult.
[0005] When it was made in view of the above and arranges two or more reflected type light emitting diodes in three dimensions, this invention can aim at improvement in mass-production nature, and aims at offering the light emitting diode array object which has the outstanding optical property that regularity is high and external radiant efficiency is high in irradiation area.
[0006]
[Means for Solving the Problem] The concave surface-like reflector which this invention countered a light emitting device, the lead section which supplies power to this light emitting device, and the luminescence side of this light emitting device, and was prepared, Two or more reflected type light emitting diodes which have the radial plane which emits outside the light reflected by this concave surface-like reflector, and the light-transmission nature material which fills the space between the aforementioned concave surface-like reflector and a radial plane while closing a part of aforementioned light emitting device and lead section, The flat-surface substrate of the center for mounting the aforementioned reflected type light emitting diode arranged in the center section, It is for mounting the aforementioned reflected type light emitting diode arranged at portions other than the flat-surface substrate of the center of this. It is formed annularly, and at least one annular flat-surface substrate arranged as enclosed the central flat-surface substrate is provided, and it is characterized by being arranged on a different flat surface from the flat-surface substrate of the center of the above, and the aforementioned annular flat-surface substrate. Moreover, a light emitting device, the lead section which supplies power to this light emitting device, and the concave surface-like reflector countered and prepared in the luminescence side of this light emitting device, Two or

more reflected type light emitting diodes which have the radial plane which emits outside the light reflected by this concave surface-like reflector, and the light-transmission nature material which fills the space between the aforementioned concave surface-like reflector and a radial plane while closing a part of aforementioned light emitting device and lead section, It is for mounting the aforementioned reflected type light emitting diode, and is characterized by being formed annularly and providing two or more annular substrates. The aforementioned annular flat-surface substrate is plurality, and it is characterized by being arranged at a different plane. furthermore, two or more aforementioned reflected type light emitting diodes It is characterized by being arranged so that the convex shaped surface of the axial symmetry in which the radial plane contains the spherical surface or a conical surface may be touched. two or more aforementioned reflected type light emitting diodes It is the straight line which passes along the center of this concave surface-like reflector when the aforementioned concave surface-like reflector is seen from a transverse plane. The aforementioned reflected type light emitting diode which the edge of the aforementioned concave surface-like reflector is cut at two perpendicular flat surfaces, and is arranged by the aforementioned annular flat-surface substrate to the straight line which intersects perpendicularly with the medial axis of a concave surface-like reflector It is characterized by being arranged by cyclic as the cutting plane of the aforementioned concave surface-like reflector adjoins each other.

[0007]

[Embodiments of the Invention] Hereafter, this invention is explained based on the example of illustration. The outline side elevation of this reflected type light emitting diode and drawing 6 of the outline enlarged view of the portion which set the outline front view of the light emitting diode array object whose drawing 1 is 1 operation gestalt of this invention, and drawing 2 in the outline cross section of drawing 1 , set drawing 3 to drawing 2 , and was surrounded with the alternate long and short dash line, the outline front view of reflected type light emitting diode with which drawing 4 is used for a light emitting diode array object, and drawing 5 are the outline plans of this reflected type light emitting diode.

[0008] The light emitting diode array object shown in drawing 1 or drawing 3 It is what is used as the light source for image recognitions, or the light source for optical fibers. For example, two or more reflected type light emitting diodes 10, It has the fixture 20 for temporary maintenance, the central flat-surface substrate 30, and at least one annular flat-surface substrate 40 arranged as enclosed the central flat-surface substrate 30, and is arranged on a flat surface which is different in the central flat-surface substrate 30 and the annular flat-surface substrate 40. With this light emitting diode array object, two or more light emitting diodes are arranged in three dimensions so that the light emitted from each light emitting diode may condense in the same irradiation area.

[0009] As shown in drawing 4 or drawing 6 , the reflected type light emitting diode 10 is equipped with a light emitting device 12, the lead sections 14a, 14b, 14c, and 14d, a bonding wire 16, the light-transmission nature material 18, the concave surface-like reflector 22, a radial plane 24, and the lead drawer section 26. Here, the z-axis is a rectangular coordinates shaft in the flat surface in which the direction of a medial axis, the x axis, and the y-axis of a concave surface-like reflector include the luminescence side of a light emitting device.

[0010] A light emitting device 12 is mounted on one edge of lead section 14a, and a light emitting device 12 and lead section 14b are electrically connected by the bonding wire 16. Moreover, a light emitting device 12 and lead sections [14a 14b, 14c, and 14d] a point and a bonding wire 16 are closed by the thermosetting light-transmission nature material 18 in one for example, using the transfer mold method. For example, the transparent EKISHIPO resin of a refractive index 1.5 is used.

[0011] The lead sections 14a and 14b are used in order to supply power to a light emitting device 12. Since light emitting diode 10 is fixed to a central flat-surface substrate, it the lead section of the light emitting diode 10 mounted in the central flat-surface substrate 30 not only supplies power to a light emitting device, but is used. And the lead sections 14a and 14b of the light emitting diode 10 mounted in the annular flat-surface substrates 40a-40e not only also supply power to a light emitting device 12, but since light emitting diode is fixed to an annular flat-surface substrate, it is used. For this reason, the lead sections 14a and 14b are the lead sections for an electric power supply-cum-fixation.

[0012] On the other hand, the lead sections 14c and 14d differ, and its lead sections 14a and 14b used as an electric terminal are unrelated to electric wiring. Especially the lead sections 14c and 14d of the light emitting diode 10 mounted in the central flat-surface substrate 30 play the role which fixes light emitting diode to the central flat-surface substrate 30. On the other hand, it is not fixed to lead section 14c of the light emitting diode 10 mounted in the annular flat-surface substrates 40a-40e, and a flat-surface substrate with annular 14d. That is, for the light emitting diode mounted in an annular flat-surface substrate, 14d is lead section 14c and an unnecessary thing. However, with this operation form, common light emitting diode can be used to a central flat-surface substrate and an annular flat-surface substrate by using what has the starting unnecessary lead section as light emitting diode mounted in an annular flat-surface substrate. Therefore, since what is necessary is just to manufacture one kind of light emitting diode, mass-production nature improves.

[0013] The concave surface-like reflector 22 carries out mirror-plane processing by plating metallurgy group vacuum evaporationo etc. on one field of the light-transmission nature material 18, and is formed in the side which counters the luminescence side of a light emitting device 12. Here, a concave surface-like reflector is formed in the abbreviation paraboloid-of-revolution configuration which counters the luminescence side of a light emitting device, and the center of the luminescence side of a light emitting device is arranged to the focus. On the other hand, a radial plane 24 is the tooth-back side of a light emitting device 12, and is formed in the position near the lead sections 14a and 14b. If it says to accuracy more, the front face of the light-transmission nature material by the

side of the tooth back of a light emitting device equivalent to the diameter of an optical path of the light reflected by the concave surface-like reflector 22 will turn into a radial plane. Here, a radial plane is formed in a flat-surface configuration perpendicular to the medial axis (z-axis) of a concave surface-like reflector. That is, with this operation form, the configuration of the position of a light emitting device, a concave surface-like reflector, and a radial plane is designed so that light emitting diode can emit parallel light.

[0014] Moreover, light emitting diode 10 is a straight line passing through the center of a concave surface-like reflector, when the concave surface-like reflector 22 is seen from a transverse plane, and it is cut by two perpendicular flat surfaces at the bilateral symmetry to the straight line (for example, x axis) which intersects perpendicularly with the medial axis of this reflector. Here, when a concave surface-like reflector is seen from a transverse plane, the edge is cut so that the rate of the length of the concave surface-like reflector after cutting to the length of the concave surface-like reflector before cutting in the direction of a x axis may be set to 0.7. Thus, the edge of a concave surface-like reflector is cut for narrowing the array interval of light emitting diode by arranging to cyclic so that the cutting plane of a concave surface-like reflector may adjoin each other.

[0015] The lead drawer section 26 is for being prepared on the outskirts of an outside of the concave surface-like reflector 22 and a radial plane 24, and pulling out the lead sections 14a, 14b, 14c, and 14d. With this operation form, since the edge of a concave surface-like reflector is cut to the bilateral symmetry, the lead drawer section will be formed in the upper and lower sides of a concave surface-like reflector, as shown in drawing 4 . In addition, the radial plane is formed so that it may project rather than the lead drawer section.

[0016] In order to manufacture this light emitting diode 10, light emitting diode is fabricated by the transfer mold method to the leadframe using a leadframe. If this transfer mold method is used, a concave surface-like reflector, a radial plane, and the lead drawer section could be fabricated with a sufficient precision, and, moreover, those configurations will be very stable. Moreover, since a leadframe can fabricate a concave surface-like reflector and a radial plane in the state where it was held firmly, position precision with a light emitting device can be enlarged. Next, the garbage of a leadframe is cut, bending processing of each lead section is performed, and light emitting diode as shown in drawing 4 is obtained. That is, as shown in drawing 3 , while bending each lead sections 14a, 14b, 14c, and 14d pulled out from the lead drawer section 26 at an abbreviation right angle near the lead drawer section at the concave surface-like reflector 22 side, the point of each lead section is bent inside.

[0017] It is reflected by the concave surface-like reflector and the light in which a light emitting device will emit light and a light emitting device will emit the light emitting diode of the above-mentioned composition if power is supplied to a light emitting device is emitted outside from a radial plane. Since the concave surface-like reflector was formed in the shape of abbreviation paraboloid of revolution and arranges the center of the luminescence side of a light emitting device to the focus especially, external radiation of the light which passed the radial plane is carried out as an parallel light to the z-axis. Thus, once reflecting the light which a light emitting device emits by the concave surface-like reflector, light emitting diode has the feature of external radiant efficiency being high and being high brightness and high luminous intensity, by emanating outside. And since the light which a light emitting device emits is controlled only by the concave surface-like reflector, there is no partial irradiation pattern in the irradiation distribution of the light emitting diode itself, and since the degree of irradiation unevenness is small, improvement in regularity can be aimed at.

[0018] As shown in drawing 2 , the central flat-surface substrate 30 is for mounting two or more reflected type light emitting diodes arranged in the center section, and as shown in drawing 7 , it is formed in a circle configuration. On the other hand, as shown in drawing 2 and drawing 3 , the annular flat-surface substrates 40a-40e are for mounting two or more reflected type light emitting diodes arranged at portions other than flat-surface substrate 30 of the center of the above, and as shown in drawing 7 , they are formed in the shape of [from which a radius differs] an annulus ring. And each annular flat-surface substrate is arranged at a different plane so that the medial axis may be in agreement with the medial axis of a central flat-surface substrate, and so that it may become stair-like along with the medial axis of a central flat-surface substrate. The reflected type light emitting diode for every ring arranged by cyclic is connected to an annular flat-surface substrate, respectively. In addition, among drawing 2 and drawing 3 , drawing 20 will show the fixture for temporary maintenance, and finally it will remove it so that it may mention later.

[0019] As shown in drawing 2 and 3, many through holes 51 and pads 52 are formed in the central flat-surface substrate 30 and the central annular flat-surface substrates 40a-40e. If it is formed in the position corresponding to the lead sections 14a-14d of light emitting diode 10 if a through hole is in a central flat-surface substrate, and it is in an annular flat-surface substrate, it is formed in the position corresponding to the lead sections 14a and 14b of light emitting diode. Here, the diameter of a through hole is designed a little to oversized compared with the diameter of the lead section. Moreover, a pad is formed near the inside of a through hole, and the through hole on a substrate. In addition, the circuit pattern for connecting the lead section is formed in the front face of a central flat-surface substrate and an annular flat-surface substrate.

[0020] In order to manufacture a light emitting diode array object using two or more reflected type light emitting diodes, cream solder is first applied to the portion in which the through hole of a central flat-surface substrate and an annular flat-surface substrate was formed from the front-face side of a substrate. Next, a central flat-surface substrate and an annular flat-surface substrate are arranged so that two or more light emitting diodes may be arranged in three dimensions, and it may become stair-like along with a central flat-surface substrate. While enlarging the diameter of a through hole compared with the diameter of the lead section of light emitting diode at this time, by having bent the point of the lead section inside, the point of the lead section can be made to be able to engage with a through hole, and a central flat-surface substrate and a central annular flat-surface substrate can be

stabilized and arranged on the lead section of predetermined light emitting diode, respectively.
[0021] Next, solder GOTE is applied to the portion in which the through hole 51 of the central flat-surface substrate 30 and the annular flat-surface substrates 40a-40e was formed from the background of a substrate, and heat is told to the front-face side of a substrate. From these, cream solder is melted and the lead section of the light emitting diode arranged at the central flat-surface substrate is soldered to the position in which the through hole of a central flat-surface substrate was formed. Here, it is not fixed to lead section 14c of the light emitting diode arranged at portions other than a central flat-surface substrate, and a flat-surface substrate with annular 14d. Moreover, the point of the lead sections 14a and 14b is connected to a circuit pattern. Thus, the lead section can be easily soldered from the background of a substrate. And finally a fixture 20 is removed. In addition, in case this light emitting diode array object is installed using the easy fastener which fixes the position of each substrate before removing a fixture, each light emitting diode can be arranged in the predetermined direction by arranging each substrate at intervals of predetermined.
[0022] With this light emitting diode array object, since all distance from the radial plane of each light emitting diode to irradiation area can be made the same, the irradiation distribution of each light emitting diode in irradiation area can be made equivalent, and can aim at improvement in regularity. Moreover, irradiation area can be irradiated with a high illuminance by having arranged two or more light emitting diodes densely.
[0023] In this example, by using an annular flat-surface substrate, this flat-surface substrate can be arranged so that the medial axis may be mostly in agreement with the medial axis of a central flat-surface substrate, and so that it may become stair-like along with the medial axis of a central flat-surface substrate. For this reason, even if the length of the lead section uses the same thing as reflected type light emitting diode, the lead section of the reflected type light emitting diode arranged cyclic is connectable with an annular flat-surface substrate. Therefore, since the light emitting diode whose length of the lead section is the same kind can be used, volume efficiency becomes large.
[0024] In addition, this invention is not limited to the aforementioned operation gestalt, and various deformation is possible for it within the limits of the summary.
[0025]
[Effect of the Invention] As explained above, as the medial axis of a central flat-surface substrate is surrounded, according to this invention, along with a medial axis, it can arrange by using an annular flat-surface substrate. For this reason, even if the length of the lead section uses the same thing as reflected type light emitting diode, the lead section arranged in portions other than a center section cyclic is connectable with an annular flat-surface substrate. Therefore, the reflected type light emitting diode whose length of the lead section is the same kind can be used, and since the productivity of reflected type light emitting diode is not inferior and time and effort does not have this thing in wiring, improvement in the mass-production nature of a light emitting diode array object can be aimed at. And high irradiation density is obtained in irradiation area, and the light emitting diode array object with which regularity has the outstanding optical property that it is high and external radiant efficiency is high is acquired.

[Translation done.]